

Appendix-H

Local Stability Summary

1. Case1: Interconnection at Garrison 230kV

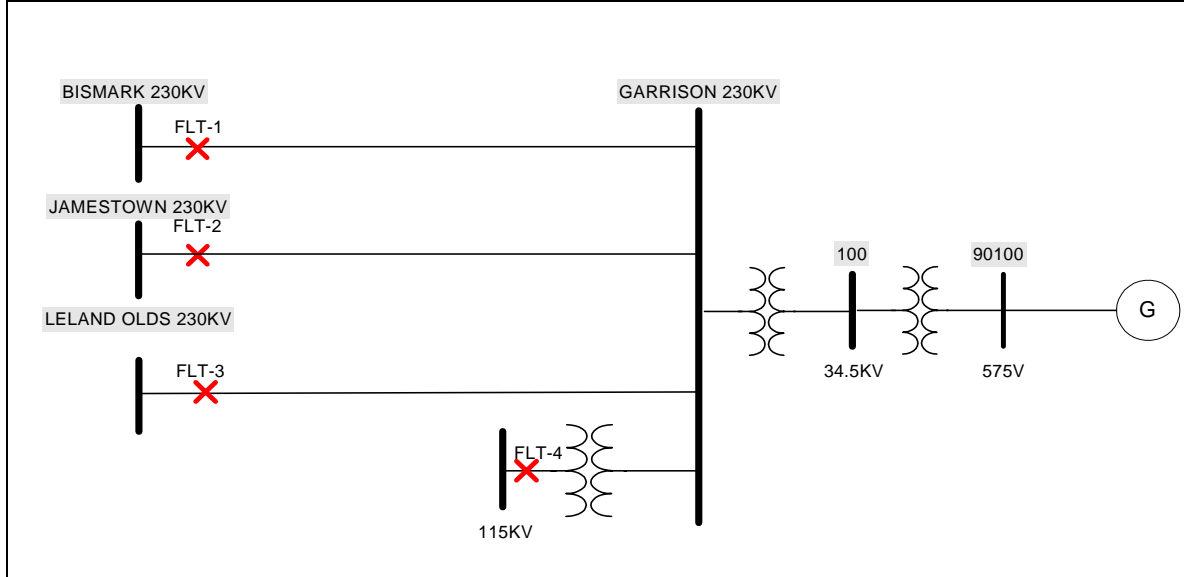


Figure 1-1 Local Faults for Garrison 230kV Interconnection

Case10-500MW Interconnection Local Fault Summary

Table 1-1 Local Fault Summary at Garrison 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3755] Uniat 1 at 90100 [GARR-5000.5750] t =0.2833
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3739] Uniat 1 at 90100 [GARR-5000.5750] t =0.2833
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3759] Uniat 1 at 90100 [GARR-5000.5750] t =0.2833
FLT-4	Dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	66442 [GARRISN7] 0.66 System Stable Trippings None

C11-375MW Interconnection Local Fault Summary

Table 1-2 Local Fault Summary at Garrison 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable	No Voltage Violations System Stable

			Trippings None	[3801] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3797] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3801] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-4	Dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	66442 [GARRISN7] 0.66 System Stable Trippings None

C12-250MW Interconnection Local Fault Summary

Table 1-3 Local Fault Summary at Garrison 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3776] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3770] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3784] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-4	Dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	66442 [GARRISN7] 0.67 System Stable Trippings None

C13-150MW Interconnection Local Fault Summary

Table 1-4 Local Fault Summary at Garrison 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3793] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3781] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3805] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-4	Dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	66442 [GARRISN7] 0.67 System Stable Trippings None

C14-50MW Interconnection Local Fault Summary

Table 1-5 Local Fault Summary at Garrison 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3804] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3747] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3824] Uniat 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-4	Dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	66442 [GARRISN7] 0.68 System Stable Trippings None

2. **Case2: Interconnection at Pickert 230kV**

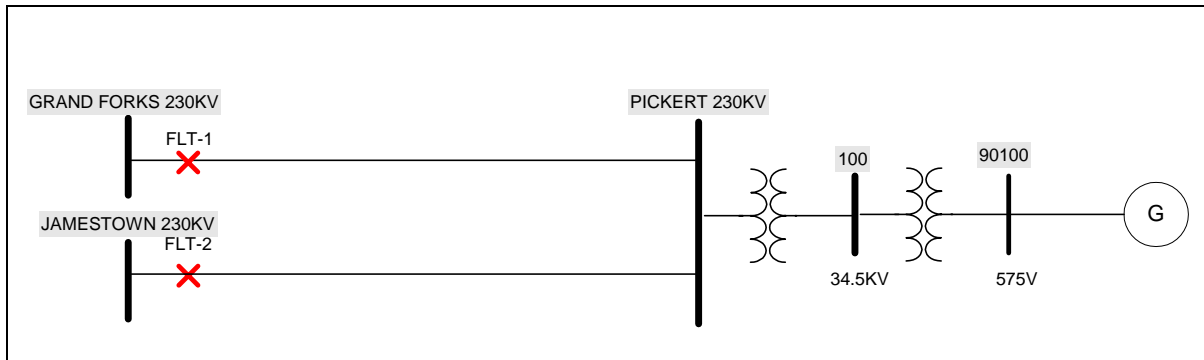


Figure 2-1 Local Faults for Pickert 230kV Interconnection

Case20-500MW Interconnection Local Fault Summary

Table 2-1 Local Fault Summary at Pickert 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3821] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2833
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3801] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2833

Case21-375MW Interconnection Local Fault Summary

Table 2-2 Local Fault Summary at Pickert 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3791] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3790] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750

Case22-250MW Interconnection Local Fault Summary

Table 2-3 Local Fault Summary at Pickert 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3766] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3766] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750

Case23-150MW Interconnection Local Fault Summary

Table 2-4 Local Fault Summary at Pickert 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3739] Unit 1 at 90100 [PICK-1500.5750] t =0.2750
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3739] Unit 1 at 90100 [PICK-1500.5750] t =0.2750

Case24-50MW Interconnection Local Fault Summary

Table 2-5 Local Fault Summary at Pickert 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3775] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2833
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3775] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2833

3. Case3: Interconnection at Leland Olds-Groton Tap (Ellendale) 345kV

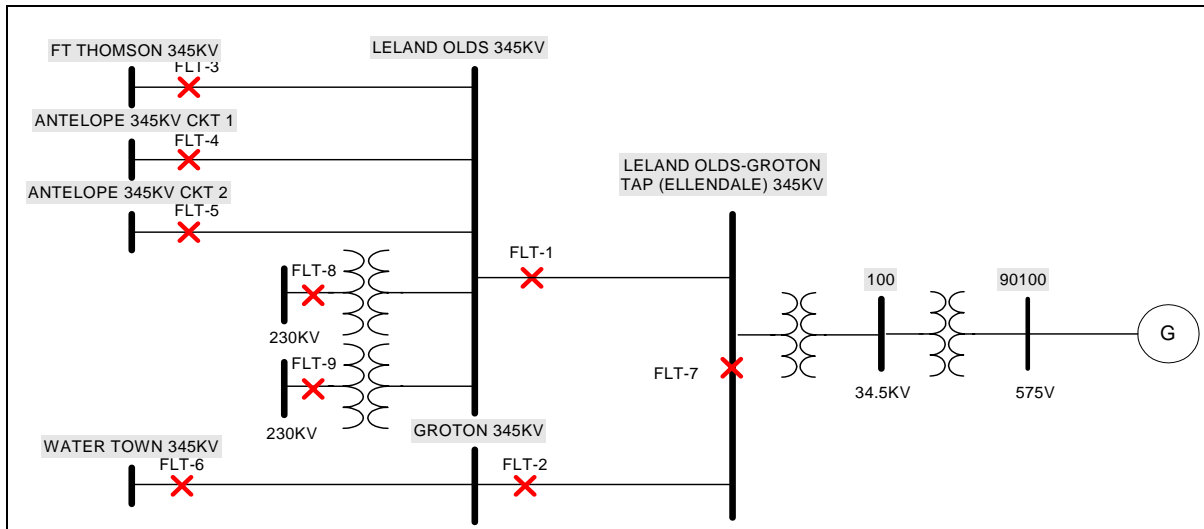


Figure 3-1 Local Faults for Leland Olds-Groton Tap (Ellendale) 345kV Interconnection

Case30-500MW Interconnection Local Fault Summary

Table 3-1 Local Fault Summary at Leland Olds-Groton Tap (Ellendale) 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton Tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable [3685] Unit 1 at 90100 [LELN-5000.5750] t =0.2833
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable [3677] Unit 1 at 90100 [LELN-5000.5750] t =0.2833
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67160 [LELAND03] 0.51 67233 [DGCX4 T] 0.54 67222 [AVSD11TY] 0.65 67395 [WISHEK 7] 0.66 1111 [GROTON 3] 0.66 67120 [HURON 3] 0.66 67394 [WISHEK 4] 0.66 +more System Unstable [3871] Unit 1 at 90100 [LELN-5000.5750] t =0.3000
FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.55 67160 [LELAND03] 0.57 67222 [AVSD11TY] 0.66 67105 [LELAND03] 0.66 67230 [DGCX3 T] 0.68 67201 [LELND1TY] 0.68 67120 [HURON 3] 0.68 +more System Unstable [3880] Uniat 1 at 90100 [LELN-

				5000.5750] t =0.3000
FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3757] Unit 1 at 90100 [LELN-5000.5750] t =0.3167
FLT-7	dq3	6 cycle 3 phase fault at Groton 345kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable [3763] Unit 1 at 90100 [LELN-5000.5750] t =0.2833
FLT-8	drs	6 cycle 3 phase fault at Leland Olds 230kV bus, clear by tripping 345/230kV transformer 1	67233 [DGCX4 T] 0.65 System Stable Trippings None	67233 [DGCX4 T] 0.57 67160 [LELAND03] 0.58 67222 [AVSD11TY] 0.67 67105 [LELAND03] 0.68 67230 [DGCX3 T] 0.69 System Stable [4034] Unit 1 at 90100 [LELN-5000.5750] t =0.2917
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 230kV bus, clear by tripping 345/230kV transformer 2	67233 [DGCX4 T] 0.66 System Stable Trippings None	67233 [DGCX4 T] 0.57 67160 [LELAND03] 0.59 67222 [AVSD11TY] 0.67 67105 [LELAND03] 0.68 67230 [DGCX3 T] 0.69 System Stable [4048] Unit 1 at 90100 [LELN-5000.5750] t =0.3083
FLT-2	dx3	4 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3612] Unit 1 at 90100 [LELN-5000.5750] t = 0.2833
FLT-3	dy3	4 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3803] Unit 1 at 90100 [LELN-5000.5750] t = 0.3000
FLT-4	dz3	4 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3801] Unit 1 at 90100 [LELN-5000.5750] t = 0.3000

Case31-375MW Interconnection Local Fault Summary

Table 3-2 Local Fault Summary at Leland Olds-Groton Tap (Ellendale) 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable [3700] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable [3662] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66	67160 [LELAND03] 0.52 67233 [DGCX4 T] 0.55 1111 [GROTON 3] 0.65 67222 [AVSD11TY] 0.66 67395 [WISHEK 7] 0.66 67394 [WISHEK 4] 0.66

			67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67203 [GROTONTY] 0.67 +more System Unstable [3837] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917
FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.57 67160 [LELAND03] 0.59 67105 [LELAND03] 0.68 67222 [AVSD11TY] 0.69 67120 [HURON 3] 0.69 System Unstable [3837] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917
FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3688] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.3583
FLT-7	dq3	6 cycle 3 phase fault at Groton 115kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable [3751] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-8	drs	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.65 System Stable Trippings None	67233 [DGCX4 T] 0.60 67160 [LELAND03] 0.61 67222 [AVSD11TY] 0.69 System Stable [4038] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.66 System Stable Trippings None	67233 [DGCX4 T] 0.61 67160 [LELAND03] 0.62 System Stable [4039] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.3000

Case32-250MW Interconnection Local Fault Summary

Table 3-3 Local Fault Summary at Leland Olds-Groton Tap (Ellendale) 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable [3711] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable [3665] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67160 [LELAND03] 0.53 67233 [DGCX4 T] 0.56 1111 [GROTON 3] 0.66 67203 [GROTONTY] 0.66 67395 [WISHEK 7] 0.66 67120 [HURON 3] 0.67 66512 [GROTON 7] 0.67 +more System Unstable [3797] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917

FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.59 67160 [LELAND03] 0.61 System Unstable [3797] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917
FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-7	dq3	6 cycle 3 phase fault at Groton 115kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable [3769] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-8	drs	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.65 System Stable Trippings None	67233 [DGCX4 T] 0.62 67160 [LELAND03] 0.63 System Stable [3985] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2917
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.66 System Stable Trippings None	67233 [DGCX4 T] 0.63 67160 [LELAND03] 0.64 System Stable [3997] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.3000

Case33-150MW Interconnection Local Fault Summary

Table 3-4 Local Fault Summary at Leland Olds-Groton Tap (Ellendale) 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable [3703] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable [3677] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67160 [LELAND03] 0.53 67233 [DGCX4 T] 0.57 1111 [GROTON 3] 0.66 67203 [GROTONTY] 0.67 67395 [WISHEK 7] 0.67 66512 [GROTON 7] 0.67 66534 [ORDWAY 7] 0.67 +more System Unstable [3823] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.3000
FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.61 67160 [LELAND03] 0.62 System Unstable [3823] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.3000

FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-7	dq3	6 cycle 3 phase fault at Groton 115kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable [3766] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-8	drs	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.65 System Stable Trippings None	67160 [LELAND03] 0.62 67233 [DGCX4 T] 0.64 1111 [GROTON 3] 0.69 System Stable [4549] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.6000
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.66 System Stable Trippings None	67160 [LELAND03] 0.64 67233 [DGCX4 T] 0.65 System Stable [4549] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.6000

Case34-50MW Interconnection Local Fault Summary

Table 3-5 Local Fault Summary at Leland Olds-Groton Tap (Ellendale) 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable [3696] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable [3686] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67160 [LELAND03] 0.55 67233 [DGCX4 T] 0.59 1111 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.67 66534 [ORDWAY 7] 0.67 67120 [HURON 3] 0.67 +more System Unstable [4395] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.5916
FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.63 67160 [LELAND03] 0.64 System Unstable [4314] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.6250
FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-7	dq3	6 cycle 3 phase fault at Groton 115kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable [3790] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750

FLT-8	drs	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.65 System Stable Trippings None	67233 [DGCX4 T] 0.65 67160 [LELAND03] 0.66 System Stable [4466] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.6333
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.66 System Stable Trippings None	67233 [DGCX4 T] 0.66 67160 [LELAND03] 0.67 System Stable [4466] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.6333

4. **Case4: Interconnection at New Underwood 230kV**

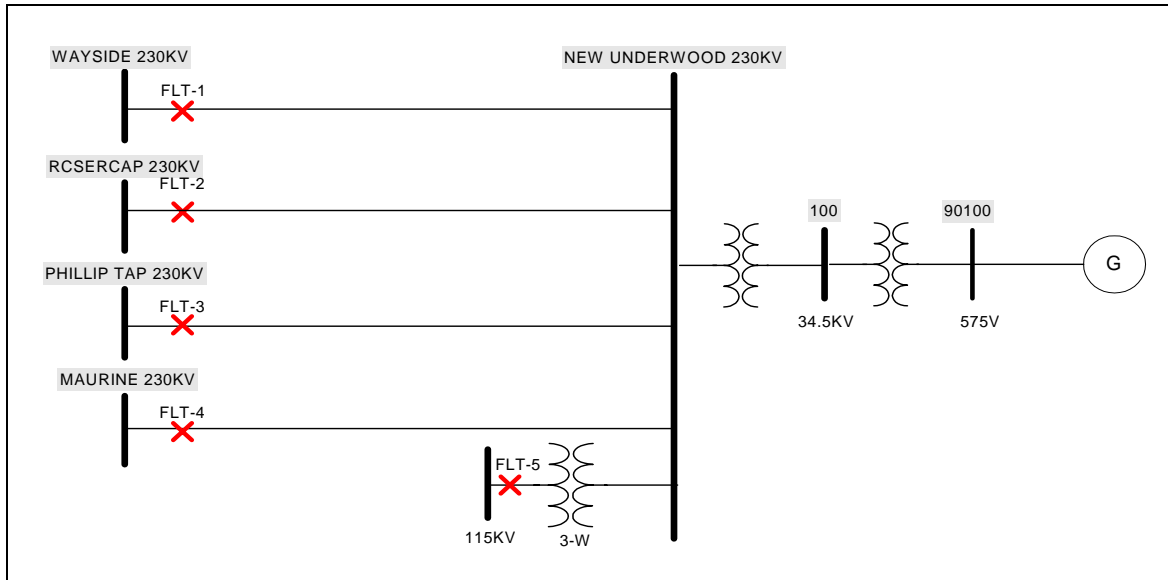


Figure 4-1 Local Faults for New Underwood 230kV Interconnection

Case40-500MW Interconnection Local Fault Summary

Table 4-1 Local Fault Summary at New Underwood 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations Diverged Trippings None	No Voltage Violations System Stable [3999] Unit1 at 90100 [NUND-5000.5750] t = 0.3167
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations Diverged Trippings None	No Voltage Violations System Stable [3960] Unit 1 at 90100 [NUND-5000.5750] t = 0.2917
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations Diverged Trippings None	No Voltage Violations System Stable [4014] Unit 1 at 90100 [NUND-5000.5750] t = 0.3000
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	No Voltage Violations Diverged Trippings None	No Voltage Violations System Stable [3986] Unit 1 at 90100 [NUND-5000.5750] t = 0.3083
FLT-5	dts	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4172] Unit 1 at 90100 [NUND-

				5000.5750] t = 0.3000
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Case41-375MW Interconnection Local Fault Summary

Table 4-2 Local Fault Summary at New Underwood 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3969] Unit 1 at 90100 [NUND-3750.5750] t = 0.3250
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable 3947] Unit 1 at 90100 [NUND-3750.5750] t = 0.2833
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3982] Unit 1 at 90100 [NUND-3750.5750] t = 0.3000
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3932] Unit 1 at 90100 [NUND-3750.5750] t = 0.3167
FLT-5	dtS	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4117] Unit 1 at 90100 [NUND-3750.5750] t = 0.3000

Case42-250MW Interconnection Local Fault Summary

Table 4-3 Local Fault Summary at New Underwood 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3968] Unit 1 at 90100 [NUND-2500.5750] t = 0.2833
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4007] Unit 1 at 90100 [NUND-2500.5750] t = 0.3000
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	dtS	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4082] Unit 1 at 90100 [NUND-2500.5750] t = 0.3083

Case43-150MW Interconnection Local Fault Summary

Table 4-4 Local Fault Summary at New Underwood 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New	No Voltage Violations System Stable	No Voltage Violations System Stable

		Underwood to Wayside 230kV line	Trippings None	Trippings None
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3945] Unit 1 at 90100 [NUND-1500.5750] t = 0.2833
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3963] Unit 1 at 90100 [NUND-1500.5750] t = 0.3000
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	dtS	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4020] Unit 1 at 90100 [NUND-1500.5750] t = 0.3583

Case44-50MW Interconnection Local Fault Summary

Table 4-5 Local Fault Summary at New Underwood 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3869] Unit 1 at 90100 [HDR_GEN 0.5750] t= 0.2750
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3866] Unit 1 at 90100 [HDR_GEN 0.5750] t= 0.2833
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	dtS	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

5. Case5: Interconnection at Mission 115kV

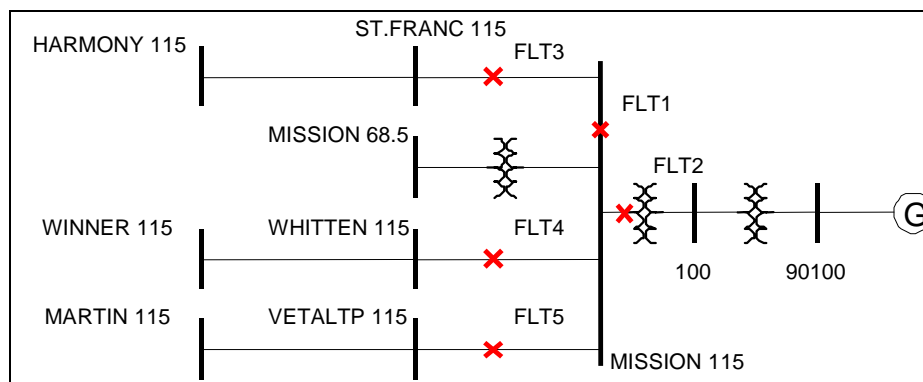


Figure 5-1 Local Faults for Mission 115kV Interconnection

Case52-250MW Interconnection Local Fault Summary

Table 5-1 Local Fault Summary at Mission 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hms	6 Cycle 3 phase fault @ Mission 115kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3650] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-2	his	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Wind generating stn. Transformer 34.5/115 kV	---NA---	No Voltage Violations System Stable [3796] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-3	hj3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – St.Franc line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3637] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.3000
FLT-4	hk3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Whitten line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3653] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.3000
FLT-5	hl3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Vetaltp line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3646] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.3000

Case53-150MW Interconnection Local Fault Summary

Table 5-2 Local Fault Summary at Mission 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	Hms	6 Cycle 3 phase fault @ Mission 115kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3654] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-2	His	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Wind generating stn. Transformer 34.5/115 kV	---NA---	No Voltage Violations System Stable [3793] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2750
FLT-3	hj3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – St.Franc line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3601] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2917
FLT-4	hk3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Whitten line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3616] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2917
FLT-5	hl3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Vetaltp line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [3618] Unit 1 at 90100 [HDR_GEN 0.5750] t = 0.2917

Case54-50MW Interconnection Local Fault Summary

Table 5-3 Local Fault Summary at Mission 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	Hms	6 Cycle 3 phase fault @ Mission 115kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

FLT-2	His	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Wind generating stn. Transformer 34.5/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hj3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – St.Franc line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hk3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Whitten line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hl3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Vetaltpl line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

6. **Case6: Interconnection at Fort Thompson 345kV**

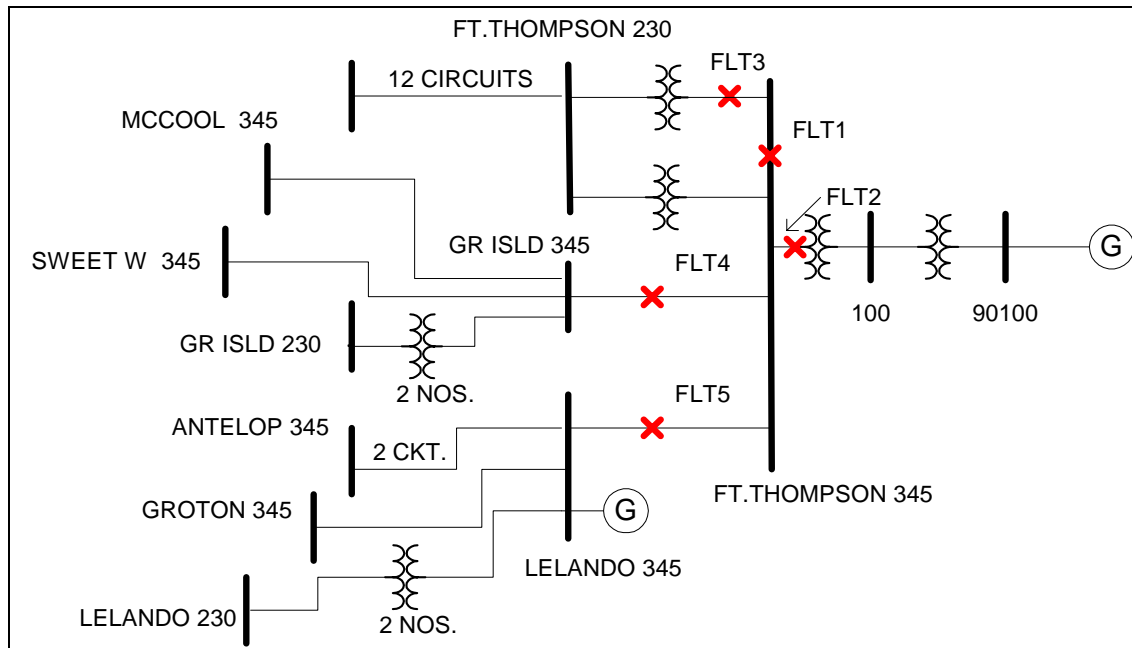


Figure 6-1 Local Faults for Ft. Thomson 345kV Interconnection

Case60-500MW Interconnection Local Fault Summary

Table 6-1 Local Fault Summary at Ft. Thompson 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind Generating Stn. Transformer 345/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66	67233 [DGCX4 T] 0.60 67160 [GROTON 3] 0.63 66512 [GROTON 7] 0.64

			66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67203 [GROTONTY] 0.64 66534 [ORDWAY 7] 0.64 67401 [ABDNJCT7] 0.65 67402 [ABDNSBT7] 0.65 +more System Unstable Trippings None
FLT-6	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

Case61-375MW Interconnection Local Fault Summary

Table 6-2 Local Fault Summary at Ft. Thompson 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind Generating Stn. Transformer 345/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67233 [DGCX4 T] 0.60 67160 [GROTON 3] 0.64 66512 [GROTON 7] 0.64 67203 [GROTONTY] 0.64 66534 [ORDWAY 7] 0.65 67401 [ABDNJCT7] 0.65 67402 [ABDNSBT7] 0.65 +more System Unstable Trippings None
FLT-5	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

Case62-250MW Interconnection Local Fault Summary

Table 6-3 Local Fault Summary at Ft. Thompson 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind Generating Stn. Transformer 345/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by	67233 [DGCX4 T] 0.59	67233 [DGCX4 T] 0.59

		tripping Ft.Thompson – Lelando line	67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.65 66534 [ORDWAY 7] 0.66 66512 [GROTON 7] 0.66 67401 [ABDNJCT7] 0.66 67402 [ABDNSBT7] 0.66 +more System Unstable Trippings None
FLT-5	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

Case63-150MW Interconnection Local Fault Summary

Table 6-4 Local Fault Summary at Ft. Thompson 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind Generating Stn. Transformer 345/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	System stable	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67401 [ABDNJCT7] 0.66 67120 [HURON 3] 0.66 +more System Unstable Trippings None
FLT-5	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

Case64-50MW Interconnection Local Fault Summary

Table 6-5 Local Fault Summary at Garrison 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind Generating Stn. Transformer 345/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable	No Voltage Violations System Stable

			Trippings None	Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.67 +more System Unstable Trippings None
FLT-5	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None

7. Case7: Interconnection at White 345kV

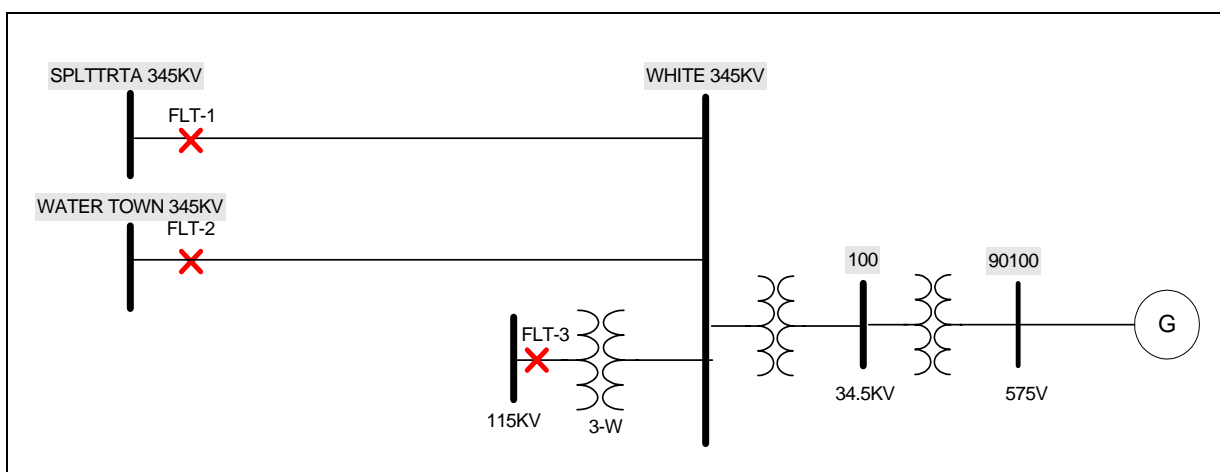


Figure 7-1 Local Faults for White 345kV Interconnection

Case70-500MW Interconnection Local Fault Summary

Table 7-1 Local Fault Summary at White 500MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3803] Unit 1 at 90100 [WHlat-5000.5750] t =0.2833 [3873] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3796] Unit 1 at 90100 [WHlat-5000.5750] t =0.2833 [3863] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4055] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833

Case71-375MW Interconnection Local Fault Summary

Table 7-2 Local Fault Summary at White 375MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3809] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3878] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3809] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3889] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833

Case72-250MW Interconnection Local Fault Summary

Table 7-3 Local Fault Summary at White 250MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3816] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3881] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3800] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3877] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4059] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833

Case73-150MW Interconnection Local Fault Summary

Table 7-4 Local Fault Summary at White 150MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3805] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3881] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3800] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3877] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250

FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4076] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833
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Case74-50MW Interconnection Local Fault Summary

Table 7-5 Local Fault Summary at White 50MW Interconnection

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3802] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3854] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3798] Unit 1 at 90100 [HDR_GEN 0.5750] t =0.2750 [3860] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4081] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833

8. Case8: Distributed Interconnection of 500MW Over All Seven Sites

Case08-100MW & 50MW Interconnection Local Fault Summary

Table 8-1 Local Fault Summary at Distributed Interconnection of 500MW Over all Seven Sites

Fault Location	Fault Name	Fault Description	Without DFIG	With DFIG
Garrison 230kV				
FLT-1	da3	6 cycle 3 phase fault at Bismark 230kV bus, clear the Garrison to Bismark 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4192] Unit 1 at 90100 [GARR-1000.5750] t =0.2833
FLT-2	db3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Garrison to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4137] Unit 1 at 90100 [GARR-1000.5750] t =0.2833
FLT-3	dc3	6 cycle 3 phase fault at Leland Olds 230kV bus, clear the Garrison to Leland Olds 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable [4208] Unit 1 at 90100 [GARR-1000.5750] t =0.2833
FLT-4	dps	6 cycle 3 phase fault at Garrison 115kV bus, clear by tripping 230/115kV transformer	66442 [GARRISN7] 0.52 66449 [MAX 7] 0.66 System Stable Trippings None	No Voltage Violations System Stable Trippings None
Pickert 230kV				
FLT-1	dd3	6 cycle 3 phase fault at Grand Fks 230kV bus, clear the Pickert to Grand Fks 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	de3	6 cycle 3 phase fault at Jamestown 230kV bus, clear the Pickert to Jamestown 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
Leland Olds- Groton Tap (Ellendale) 345kV				
FLT-1	df3	6 cycle 3 phase fault at Leland Olds 345kV bus, clear the Leland-Groton tap to Leland Olds 345kV line	Not Tested	No Voltage Violations System Stable

				Trippings None
FLT-2	dg3	6 cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	67233 [DGCX4 T] 0.60 67395 [WISHEK 7] 0.64 67120 [HURON 3] 0.64 67394 [WISHEK 4] 0.65 67326 [ELLENDL4] 0.67 63199 [JAMSTN1Y] 0.67 63200 [JAMSTN2Y] 0.67 +more System Unstable Trippings None	No Voltage Violations System Stable Trippings None
FLT-3	dh3	6 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67233 [DGCX4 T] 0.58 1111 [GROTON 3] 0.64 66512 [GROTON 7] 0.65 67203 [GROTONTY] 0.65 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.67 +more System Unstable Trippings None
FLT-4	di3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	67233 [DGCX4 T] 0.62 System Stable Trippings None	No Voltage Violations System Unstable Trippings None
FLT-5	dj3	6 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 2	67233 [DGCX4 T] 0.62 System Stable Trippings None	67233 [DGCX4 T] 0.61 1111 [GROTON 3] 0.68 67120 [HURON 3] 0.69 67203 [GROTONTY] 0.69 66512 [GROTON 7] 0.69 67402 [ABDNSBT7] 0.69 67401 [ABDNJCT7] 0.69 System Unstable Trippings None
FLT-6	dk3	6 cycle 3 phase fault at Watertown 345kV bus, clear the Groton to Watertown 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-7	dq3	6 cycle 3 phase fault at Groton 115kV bus, clear by tripping Leland Olds-Groton 345kV line (both side of tap)	Not Tested	No Voltage Violations System Stable Trippings None
FLT-8	drs	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.65 System Stable Trippings None	67233 [DGCX4 T] 0.64 System Unstable Trippings None
FLT-9	dss	6 cycle 3 phase fault at Leland Olds 345kV bus, clear by tripping 345/230kV transformer	67233 [DGCX4 T] 0.66 System Stable Trippings None	67233 [DGCX4 T] 0.65 System Unstable Trippings None
FLT-2	dx3	4cycle 3 phase fault at Groton 345kV bus, clear the Leland-Groton tap to Groton 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-3	dy3	4 cycle 3 phase fault at Ft. Thomson 345kV bus, clear the Leland Olds to Ft. Thomson 345kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	dz3	4 cycle 3 phase fault at Antelope 345kV bus, clear the Leland Olds to Antelope 345kV line 1	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
New Underwood 230kV				
FLT-1	dls	6 cycle 3 phase fault at Wayside 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-2	dms	6 cycle 3 phase fault at Rcsercap 230kV bus and disconnection of RCDC line, clear the New Underwood to Wayside 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-3	dns	6 cycle 3 phase fault at Pillips tap 230kV bus and disconnection of RCDC line, clear the New Underwood to Pillips tap 230kV line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	dos	6 cycle 3 phase fault at Maurine 230kV bus and	No Voltage Violations	No Voltage Violations

		disconnection of RCDC line, clear the New Underwood to Maurine 230kV line	System Stable Trippings None	System Stable Trippings None
FLT-5	dts	6 cycle 3 phase fault at New Underwood 115kV bus, clear by tripping 230/115/13.8kV 3-Winding transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
Mission 115kV				
FLT-1	hms	6 Cycle 3 phase fault @ Mission 115kV, Clear the fault	No Voltage Violations System Stable Trippings None	Not tested
FLT-2	his	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Wind generating stn. Transformer 34.5/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hj3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – St.Franc line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hk3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Whitten line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hl3	6 Cycle 3 phase fault @ Mission 115kV, Clear fault by tripping Mission – Vetaltpl line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
Ft. Thomson 345kV				
FLT-1	hes	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear the fault	No Voltage Violations System Stable Trippings None	Not tested
FLT-2	has	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Wind generating stn. Transformer 34.5/115 kV	---NA---	No Voltage Violations System Stable Trippings None
FLT-3	hbs	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson 345/230 kV transformer	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-4	hc3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Gr Isld line	No Voltage Violations System Stable Trippings None	No Voltage Violations System Stable Trippings None
FLT-5	hd3	6 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	67233 [DGCX4 T] 0.59 67160 [GROTON 3] 0.65 67203 [GROTONTY] 0.66 66512 [GROTON 7] 0.66 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.66 +more System Unstable Trippings None	67233 [DGCX4 T] 0.58 1111 [GROTON 3] 0.64 66512 [GROTON 7] 0.65 67203 [GROTONTY] 0.65 66534 [ORDWAY 7] 0.66 67120 [HURON 3] 0.66 67395 [WISHEK 7] 0.67 +more System Unstable Trippings None
FLT-6	hf3	4 Cycle 3 phase fault @ Ft.Thompson 345kV, Clear fault by tripping Ft.Thompson – Lelando line	No Voltage Violations System Stable Trippings None	Same as dx3
White 345kV				
FLT-1	du3	6 cycle 3 phase fault at SPLTRTA 345kV bus, clear by tripping White-SPLTRTA 345kV line	No Voltage Violations System Stable [3762] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3797] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-2	dv3	6 cycle 3 phase fault at Water Town 345kV bus, clear by tripping White-Water Town 345kV line	No Voltage Violations System Stable [3758] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250	No Voltage Violations System Stable [3774] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.3250
FLT-3	dws	6 Cycle fault at White 115kV bus, Clear by tripping 345/115/13.8kV 3-Winding Transformer	No Voltage Violations System Stable [4062] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833	No Voltage Violations System Stable [4059] Unit 1 at 90714 [YNKEDFIG0.5750] t =0.2833